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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ART UNIT	PAPER NUMBER
3741	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/580,696	ESSER, WINFRIED
	Examiner	Art Unit
	PHUTTHIWAT WONGWIAN	3741

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19,21-24,26-34,36 and 38-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19,21-24,26-34,36 and 38-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/26/2010 has been entered.

2. Claims 1-18, 20, 25, 35, 37 and 43-44 have been canceled and accordingly claims 19, 21-24, 26-34, 36 and 38-42 are currently pending in this application.

Response to Arguments

3. Applicant's arguments with respect to claims19, 21-24, 26-34, 36 and 38-42 on pages 2-6 of the remarks have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. Claims 1, 23, 34, 36, 38-39 and 41 objected to because of the following informalities:

5. Claim 19, “the addition” is believed to be in error for - - addition - -

6. Claim 23, "the strength", "the formation" and "the group" is believed to be in error for - - strength - -, - - formation - - and - - group - -.

7. Claim 36, "the precipitation" is believed to be in error for - -the precipitant- -.

8. Claim 38, "the longitudinal axis" is believed to be in error for - -a longitudinal axis- -.

9. Claim 38, "at least one combustion chamber or turbine component" is believed to be in error for - - at least one <u>of the</u> combustion chamber or <u>a</u> turbine component - -

10. Claim 38, "the addition" and "the group" is believed to be in error for - -addition- - and - - group - -.

11. Claim 39, "the addition" is believed to be in error for - -addition- -.

12. Claim 41 "the selected" is believed to be in error for - -selected - -.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 21-22, 26, 34 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

15. Claims 21-22 can not dependent on the canceled claim 20, for the purpose of examination, claims 21-22 will be interpreted as the dependent of claim 19.

16. Claim 26 recites the limitation "the superalloy". There is insufficient antecedent basis for this limitation in the claim.

17. Claim 34 recites the limitation "the component material". There is insufficient antecedent basis for this limitation in the claim.

18. Claim 36 recites the limitation "the gamma phase". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

20. Claims 23-24, 26 and 40 are rejected under 35 U.S.C. 102(b) as being by Bicicchi (GB 1,534,399).

21. As to claim 23, Bicicchi discloses a gas turbine high temperature resistant component (page 2, line 22, "the present invention relates to a forged turbine bucket") made from a precipitant containing alloy (the alloy with all of the substances, see page 2, line 25-36 has to be precipitated in order for all substances on page 2, line 25-36, to form a single alloy of a piece of metal), comprising: a metallic strength promoter in an amount of 50 ppm to 500 ppm (page 2, line 33, "Tin 0.03 max" or 300 ppm) that increases the strength (col. 2, line 41, "heat treating the forged bucket turbine to a yield strength level in excess of 100,000 psi") of the component by increasing the formation

of precipitants [desired result] where the strength promoter is selected from the group consisting of: zinc (Zn), tin (Sn) (page, line 33, "Tin"), gallium (Ga), selenium (Se), and arsenic (As), wherein the superalloy contains between 100 to 500 ppm (col. 2, line 33, "Tin 0.03 max" or 300 ppm) of the strength promoter and wherein the selected strength promoter is tin (col. 2, line 33, "Tin").

Note that the unit conversion for percent by weight to ppm is: percent by weight * 10000 = ppm;

And the term precipitate is defined as "cause (a substance) to be deposited in solid from a solution".

Also note that "the precipitations" is established by "suitable heat treatment in the superalloys after casting" page 3, lines 15-19 of the specification.

22. As to claim 24, Bicicchi discloses the component consists of a nickel-base, cobalt-base or iron-base superalloy (page 2, line 36, "Iron Balance", or page 10, line 16, "Iron Remainder", the alloy contains more iron than any other composition, therefore it is considered to be an iron-base superalloy).

Note that the term "superalloy" is defined as "an alloy capable of withstanding high temperature", in this case the bucket turbine Bicicchi can be considered as "superalloy".

23. As to claims 26 and 40, Bicicchi discloses the superalloy contains between 100 to 500 ppm (col. 2, line 33, "Tin 0.03 max" or 300 ppm) of the strength promoter and wherein the selected strength promoter is tin (col. 2, line 33, "Tin 0.03 max" or 300 ppm).

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

25. Claim 19, 38-39 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bicicchi in view of Patterson (US Patent No. 4,023,919).

26. As to claim 19, Bicicchi discloses a turbine bucket (page 2, line 22, "the present invention relates to a forged turbine bucket") comprising a superalloy (page 2, line 22-23, "turbine bucket formed from an alloy", the alloy is considered to meet the term "superalloy" since it can withstand high temperature) is precipitation strengthened (col. 2, line 41, "heat treating the forged bucket turbine to a yield strength level in excess of 100,000 psi") by the addition of 50 ppm to 500 ppm (page 2, line 33, "Tin 0.03 max" or 300 ppm) of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn) (page, line 33, "Tin"), gallium (Ga), selenium (Se), and arsenic (As).

Bicicchi does not explicitly show the detail structure of *a high temperature gas turbine component or bucket turbine comprising: a root section; a platform section arranged adjacent to the root section; a tip section arranged radially opposite the root section; a leading edge arranged between the platform and tip sections; a trailing edge arranged downstream of the leading edge; and a main section arranged between the leading edge, trailing edge, platform section and tip sections.*

Fig 1

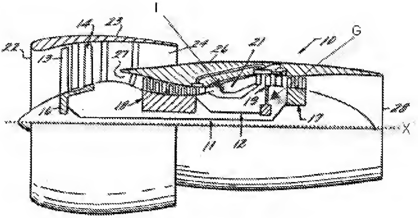
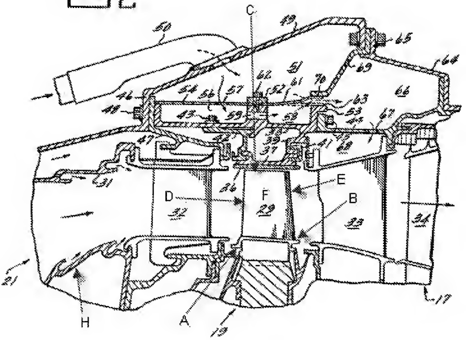


Fig 2



However, Patterson teaches it is well known in the gas turbine art that a bucket turbine or a turbine (col. 4, line 17-18, “a single-stage row of rotor blades or buckets 29 rotatably disposed in the flow path”) comprising: a root section A (fig. 2 above); a platform section B (fig. 2 above) arranged adjacent to the root section A (fig. 2 above); a tip section C (fig. 2 above) arranged radially opposite the root section A (fig. 2 above); a leading edge D (fig. 2 above) arranged between the platform B (fig. 2 above) and tip C

(fig. 2 above) sections; a trailing edge E (fig. 2 above) arranged downstream of the leading edge D (fig. 2 above); and a main section F (fig. 2 above) arranged between the leading edge D (fig. 2 above), trailing edge E (fig. 2 above), platform section B (fig. 2 above) and tip sections C (fig. 2 above).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Bicicchi's invention such that the bucket turbine includes *a root section; a platform section arranged adjacent to the root section; a tip section arranged radially opposite the root section; a leading edge arranged between the platform and tip sections; a trailing edge arranged downstream of the leading edge; and a main section arranged between the leading edge, trailing edge, platform section and tip sections*, as suggested and taught by Patterson, for the purpose providing a suitable turbine structure that can efficiently extract energy from the combustion exhaust gas flow to produce thrust for propelling the aircraft or the drive the electrical generator.

27. As to claim 38, Bicicchi discloses a turbine component (page 2, line 22, "the present invention relates to a forged turbine bucket") is formed from a nickel, cobalt or iron (page 2, line 36, "Iron Balance", the alloy contains more iron than any other composition, therefore it is considered to be an iron-base superalloy) superalloy (page 2, line 22-23, "turbine bucket formed from an alloy", the alloy is considered to meet the term "superalloy" since it can withstand high temperature) that is precipitation strengthened (col. 2, line 41, "heat treating the forged bucket turbine to a yield strength level in excess of 100,000 psi") by the addition of 50 ppm to 500 ppm (page 2, line 33, "Tin 0.03 max" or 300 ppm) of a strength promoter (page, line 33, "Tin") selected from

the group consisting of: zinc (Zn), tin (Sn) (page, line 33, "Tin"), gallium (Ga), selenium (Se), and arsenic (As).

Bicicchi does not explicitly show the detail structure of *a gas turbine engine having a rotationally mounted rotor arranged coaxially with the longitudinal axis of the engine; an intake housing arranged coaxially with the rotor that intakes a working fluid; a compressor that compresses the working fluid; an annular combustion chamber comprised of a plurality of components that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid; and a turbine section that expands the hot working fluid.*

However, Patterson teaches a gas turbine engine10 (fig. 1) having a rotationally mounted rotor 16 (fig. 1) arranged coaxially with the longitudinal axis X (fig. 1 above) of the engine; an intake housing 23 (fig. 1) arranged coaxially with the rotor16 (fig. 1) that intakes a working fluid; a compressor 18 (fig. 1) that compresses the working fluid (col. 3, line 64-66, "The pressurized air which enters....is further pressurized by means of the compressor 18"); an annular combustion chamber 21 (fig. 1, col. 4, line 20, "annular combustor inner casing 31") comprised of a plurality of components 31, H, I (fig. 1 and 2 above, element I is the front end liner that bound the combustion chamber and also a plurality of fuel injectors and at least one ignitor are not shown in the drawing but are disposed in the combustion chamber) that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid (col. 3, line 65-68 to col. 4, line 1, "The

pressurized air which enters the core engine passageway 27 is further pressurized by means of the compressor 18 and is thereafter ignited along with high energy fuel in the combustion system 21. This highly energized gas stream then flow"); and a turbine section 19-17 (fig. 1) that expands the hot working fluid (col. 3, line 68 to col. 4, line 1, "This high gas stream then flows through the high pressure turbine 19").

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Bicicchi's invention to include *a gas turbine engine having a rotationally mounted rotor arranged coaxially with the longitudinal axis of the engine; an intake housing arranged coaxially with the rotor that intakes a working fluid; a compressor that compresses the working fluid; an annular combustion chamber comprised of a plurality of components that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid; and a turbine section that expands the hot working fluid* (it would have been obvious to use the turbine bucket of Bicicchi in the gas turbine engine as described in Patterson), as suggested and taught by Patterson, for the purpose of providing a suitable gas turbine engine that capable of operating over a variable speed schedule without attendant interference between the rotor and stator (col. 2, line 45-48).

28. As to claim 39, Bicicchi discloses a turbine bucket (page 2, line 22, "the present invention relates to a forged turbine bucket") comprising a superalloy (page 2, line 22-23, "turbine bucket formed from an alloy", the alloy is considered to meet the term "superalloy" since it can withstand high temperature) is precipitation strengthened (col.

2, line 41, "heat treating the forged bucket turbine to a yield strength level in excess of 100,000 psi") by the addition of 100 ppm to 500 ppm (page 2, line 33, "Tin 0.03 max" or 300 ppm) of a strength promoter and wherein the strength promoter is tin (Sn) (page, line 33, "Tin").

Bicicchi does not explicitly show the detail structure of *a high temperature gas turbine component or bucket turbine comprising: a root section; a platform section arranged adjacent to the root section; a tip section arranged radially opposite the root section; a leading edge arranged between the platform and tip sections; a trailing edge arranged downstream of the leading edge; and a main section arranged between the leading edge, trailing edge, platform section and tip sections.*

However, Patterson teaches it is well known in the gas turbine art that a bucket turbine or a turbine (col. 4, line 17-18, “a single-stage row of rotor blades or buckets 29 rotatably disposed in the flow path”) comprising: a root section A (fig. 2 above); a platform section B (fig. 2 above) arranged adjacent to the root section A (fig. 2 above); a tip section C (fig. 2 above) arranged radially opposite the root section A (fig. 2 above); a leading edge D (fig. 2 above) arranged between the platform B (fig. 2 above) and tip C (fig. 2 above) sections; a trailing edge E (fig. 2 above) arranged downstream of the leading edge D (fig. 2 above); and a main section F (fig. 2 above) arranged between the leading edge D (fig. 2 above), trailing edge E (fig. 2 above), platform section B (fig. 2 above) and tip sections C (fig. 2 above).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Bicicchi’s invention such that the bucket turbine

includes *a root section; a platform section arranged adjacent to the root section; a tip section arranged radially opposite the root section; a leading edge arranged between the platform and tip sections; a trailing edge arranged downstream of the leading edge; and a main section arranged between the leading edge, trailing edge, platform section and tip sections*, as suggested and taught by Patterson, for the purpose providing a suitable turbine structure that can efficiently extract energy from the combustion exhaust gas flow to produce thrust for propelling the aircraft or the drive the electrical generator.

29. As to claims 41-42, Bicicchi discloses the selected strength promoter is tin (page 2, line 33, "Tin 0.03 max" or 300 ppm) and wherein the superalloy contains between 100 to 500 ppm (page 2, line 33, "Tin 0.03 max" or 300 ppm) of the strength promoter.

30. Claim 19, 21-24, 26-34, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel (US Patent No. 7,005,015) in view of Bicicchi or Clark (US Patent No. 4,962,586) or Bodnar (US Patent No. 5,108,699) or Boyle (US Patent No. 3,139,337).

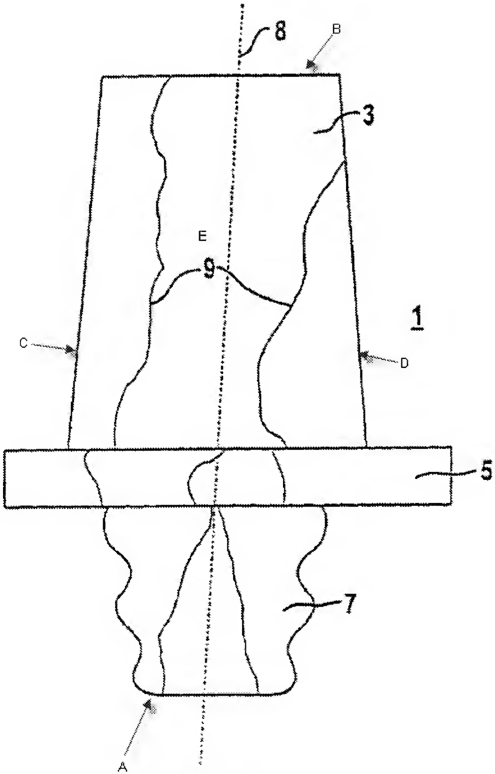


FIG 1

31. As to claim 19, Burgel discloses a high temperature gas turbine component the made from a superalloy (col. 2, line 21, "a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections.

Burgel does not explicitly disclose that *the superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As).*

However, Bicicchi teaches the turbine bucket (page 2, line 39, "form a turbine bucket") that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, "0.03 max" or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, "Tin").

Clark teaches a turbine rotor segment 3 (fig. 1) the made of an alloy (col. 3, line 32) that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line

31-32, “less than 0.015” or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 31-32, "less than 0.015 percent of Sn").

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, “less than about 0.010 percent tin” above 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel’s invention to include *the superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As)*, as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, “an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs”) or (Clark, page 3, line 18-20, “A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)”) or (Boyle, col. 5, line 26-30, “the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture

ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlement, has better hardenability").

32. As to claims 21-22, Burgel discloses the superalloy comprises: (see table below).

	Claim 21	Claim 22	Burgel
Chromium	11-13 wt%	9-<11 wt%	11-13 wt%
Tungsten	3-5 wt%	3-5 wt%	3-5 wt%
Molybdenum	0.5-2.5 wt%	0.5-2.5 wt%	0.5-2.5 wt%
Aluminum	3-5 wt%	3-5 wt%	3-5 wt%
Titanium	3-5 wt%	3-5 wt%	3-5 wt%
Tantalum	3-7 wt%	3-7 wt%	3-7 wt%
Cobalt	0-12 wt%	0-12 wt%	0-12 wt%
Niobium	0-1 wt%	0-1 wt%	0-1 wt%
Hafnium	0-2 wt%	0-2 wt%	0-2 wt%
Zirconium	0-1 wt%	0-1 wt%	0-1 wt %
Boron	0-0.05 wt%	0-0.05 wt%	0-0.05 wt%
Carbon	0 -0.2 wt%	0 -0.2 wt%	0-0.2 wt%
Rhenium or Ruthenium	0.1-10 wt%	0.1-5 wt%	1-5 wt% (Re) 0-5 wt% (Ru)
Nickel or cobalt or iron and impurities	Remainder	Remainder	Remainder

In claim 21, Burgel discloses the elements (chromium, tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed and the elements (Ru or Re) is within

the claimed range (0.1-10) with 10 percent by weight (Re and Ru of Burgel is 5 wt% each with 10 wt% max) maximum as claimed (Re or Ru is 10 wt% max), therefore, the remainder will be about the same percentage by weight.

Further, it would have been obvious to select any portion of the discloses ranges of (Re or Ru) that include the instant claimed ranges, in view of the fact that "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable Re or Ru percentage range in the superalloy, thereby, optimizing the strength of the alloy.

In claim 22, Burgel discloses the elements (tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed, the elements (Re or Ru) is within the claimed range and percentage by weight of chromium is very closed to the claimed range.

Therefore, it would have been obvious for one of ordinary skill in the art at the time invention was made to have the portion of chromium and (Re and Ru) to be within the claimed range, sine it had been held that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that

one skilled in the art would have expected them to have the same properties." [MPEP 2144.05, I] Titannium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.)" and "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable chromium and (Re and Ru) percentage range in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." <u>In re Peterson</u>, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

33. As to claims 23, 26 and 40, Burgel discloses a high temperature gas turbine component the made from a precipitant containing alloy (col. 2, line 21, “a nickel-base superalloy" and col. 4, line 55-56, "a melt 101 of metal").

Burgel does not explicitly disclose that *the metallic strength promoter is in an amount of 50 ppm to 500 ppm that increases the strength of the component by increasing the formation of precipitants where the strength promoter is selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As) and wherein the alloy contains between 100 to 500 ppm of the strength promoter (claim 26) and where the strength promoter is selected from tin (Sn) (claim 40).*

However, Bicicchi teaches the turbine bucket (page 2, line 39, “form a turbine bucket”) that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, “0.03 max” or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, “Tin”).

Clark teaches a turbine rotor segment 3 (fig. 1) the made of an alloy (col. 3, line 32) that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 31-32, “less than 0.015” or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 31-32, "less than 0.015 percent of Sn").

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, “less than about

0.010 percent tin", 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention to include *the superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As) and wherein the alloy contains between 100 to 500 ppm of the strength promoter and where the strength promoter is selected from tin (Sn),* as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable

characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlement, has better hardenability").

34. As to claim 24, Burgel discloses the component consists of a nickel-base (col. 2, line 21, "a nickel-base superalloy"), cobalt-base or iron-base superalloy.

35. As to claims 27-28, Burgel discloses the superalloy comprises: (see table below).

	Claim 27	Claim 28	Burgel
Chromium	11-13 wt%	9-<11 wt%	11-13 wt%
Tungsten	3-5 wt%	3-5 wt%	3-5 wt%
Molybdenum	0.5-2.5 wt%	0.5-2.5 wt%	0.5-2.5 wt%
Aluminum	3-5 wt%	3-5 wt%	3-5 wt%
Titanium	3-5 wt%	3-5 wt%	3-5 wt%
Tantalum	3-7 wt%	3-7 wt%	3-7 wt%
Cobalt	0-12 wt%	0-12 wt%	0-12 wt%
Niobium	0-1 wt%	0-1 wt%	0-1 wt%
Hafnium	0-2 wt%	0-2 wt%	0-2 wt%
Zirconium	0-1 wt%	0-1 wt%	0-1 wt %
Boron	0-0.05 wt%	0-0.05 wt%	0-0.05 wt%
Carbon	0 -0.2 wt%	0 -0.2 wt%	0-0.2 wt%
Rhenium or Ruthenium	0.1-10 wt%	0.1-5 wt%	1-5 wt% (Re) 0-5 wt% (Ru)
Nickel or cobalt or iron and impurities	Remainder	Remainder	Remainder

In claim 27, Burgel discloses the elements (chromium, tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed and the elements (Ru or Re) is within

the claimed range (0.1-10) with 10 percent by weight (Re and Ru of Burgel is 5 wt% each with 10 wt% max) maximum as claimed (Re or Ru is 10 wt% max), therefore, the remainder will be about the same percentage by weight.

Further, it would have been obvious to select any portion of the discloses ranges of (Re or Ru) that include the instant claimed ranges, in view of the fact that "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable Re or Ru percentage range in the superalloy, thereby, optimizing the strength of the alloy.

In claim 28, Burgel discloses the elements of (tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed, the elements (Re or Ru) is within the claimed range and percentage by weight of chromium is very closed to the claimed range.

Therefore, it would have been obvious for one of ordinary skill in the art at the time invention was made to have the portion of chromium and (Re and Ru) to be within the claimed range, sine it had been held that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that

one skilled in the art would have expected them to have the same properties." [MPEP 2144.05, I] Titannium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.)" and "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable chromium and (Re and Ru) percentage range in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." In re Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

36. As to claims 29-33, discloses the superalloy contains: (see table below).

	Claim 29	Claim 30	Claim 31	Claim 32	Claim 33	Burgel
Aluminum	3-<3.5 wt%					3-5 wt%
Rhenium		1.3-10 wt%	1.3-5 wt%			1-5 wt%
Ruthenium				1.3-3 wt%	0.5-5 wt%	0-5 wt%

In claims 29-33, the superalloy compositions discloses by Burgel overlaps the applicant's claimed superalloy compositions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to select any portion of the discloses ranges of (Al, Re and Ru) that include the instant claimed ranges from the ranges discloses in the prior art reference, particularly in view of the fact that "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within

[applicant's] claimed range.")" [MPEP 2144.05, I], as suggested and taught by, Burgel, for the purpose of providing a suitable aluminum, rhenium and ruthenium percentage ranges in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." In re Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

37. As to claim 34, Burgel discloses the component material has an isotropic distribution, directionally solidified (col. 3, line 41, "the component preferably has a directionally solidified grain"), or single-crystal grain structure.

38. As to claim 39, Burgel discloses a high temperature gas turbine component the made from a superalloy (col. 2, line 21, "a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections.

Burgel does not explicitly disclose that *the superalloy is precipitation strengthened by the addition of 100 ppm to 500 ppm of a strength promoter is selected from tin (Sn).*

However, Bicicchi teaches the turbine bucket (page 2, line 39, “form a turbine bucket”) that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, “0.03 max” or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, “Tin”).

Clark teaches a turbine rotor segment 3 (fig. 1) the made of an alloy (col. 3, line 32) that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 31-32, “less than 0.015” or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 31-32, "less than 0.015 percent of Sn").

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, “less than about 0.010 percent tin” about 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel’s invention to include *the superalloy is*

precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As), as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlement, has better hardenability").

39. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle and Yoshinari (US Patent No. 5,611,670).

40. As to claim 36, Burgel discloses the essential of the claimed invention except *the precipitation is the gamma phase.*

However, Yoshinari teaches a nickel base superalloy (col. 8, line 17-18, “the Ni-base superalloy which constitutes the blades for the gas turbine") for the gas turbine blade that undergo a heat treatment of dissolving precipitated y' -phases into gamma phase of the base (col. 7, line 30-35).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel’s invention such that *the precipitation is the gamma phase* (it would have been obvious for the nickel alloy blade of Burgel to undergo gamma phase as described by Yoshinari), as suggested and taught by Yoshinari, for the purpose of providing the turbine blade with a high creep strength (col. 7, line 32-33).

41. Claims 38 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle and Taylor (US Patent No. 3,631,674).

42. As to claims 38 and 41-42, Burgel discloses a gas turbine component (col. 4, line 41, "a gas turbine blade") the made from a superalloy (col. 2, line 21, “a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and

a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections.

Burgel does not explicitly disclose that *a gas turbine engine, comprising: a rotationally mounted rotor arranged coaxially with the longitudinal axis of the engine; an intake housing arranged coaxially with the rotor that intakes a working fluid; a compressor that compresses the working fluid; an annular combustion chamber comprised of a plurality of components that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid; and a turbine section that expands the hot working fluid, the superalloy is precipitation strengthened by the addition of 100 ppm to 500 ppm (claim 38 and 42) of a strength promoter is selected from tin (Sn) (claim 41).*

However, Taylor teaches a gas turbine engine 10 (fig. 1), comprising: a rotationally mounted rotor 18 (fig. 1) arranged coaxially with the longitudinal axis (fig. 1, the central axis of the engine) of the engine; an intake housing 12 (fig. 1) arranged coaxially with the rotor that intakes a working fluid (fig. 1); a compressor 18 (fig. 1) that compresses the working fluid; an annular combustion chamber 27 (fig. 1) comprised of a plurality of components 46, 38, 40 (fig. 2) that accepts the compressed working fluid (fig. 2), mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid (col. 4, line 28-36); and a turbine section 28 (fig. 1) that expands the hot working fluid.

Bicicchi teaches the turbine bucket (page 2, line 39, “form a turbine bucket”) that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, “0.03 max” or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, “Tin”).

Clark teaches a turbine rotor segment 3 (fig. 1) the made of an alloy (col. 3, line 32) that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 31-32, “less than 0.015” or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 31-32, "less than 0.015 percent of Sn").

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, “less than about 0.010 percent tin” about 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel’s invention to include *a gas turbine engine, comprising: a rotationally mounted rotor arranged coaxially with the longitudinal axis of the engine; an intake housing arranged coaxially with the rotor that intakes a working fluid; a compressor that compresses the working fluid; an annular combustion chamber*

comprised of a plurality of components that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid; and a turbine section that expands the hot working fluid, the superalloy is precipitation strengthened by the addition of 100 ppm to 500 ppm of a strength promoter is selected from tin (Sn), as suggested and taught by, Taylor and Bicicchi or Clark or Bodnar or Boyle, for the purpose of providing a suitable gas turbine engine with a shorter and more efficient combustor for the aircraft gas turbine engine (Taylor, col. 2, line 11-13) and providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlement, has better hardenability").

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHUTTHIWAT WONGWIAN whose telephone number is (571)270-5426. The examiner can normally be reached on Monday - Thursday, 7:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, EHUD GARTENBERG can be reached on 571-272-4828. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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